

Sheet 4

[5]

ADD # Num, R₁

immediate

(a)

Suppose your instruction is two word so your operand in 2nd word

1 - PC_{out}, MAR_{in}, Read, select 4, add, Z_{in}

2 - Z_{out}, PC_{in}, Y_{in}, WMfc

3 - MDR_{out}, IR_{in}

4 - PC_{out}, MAR_{in}, Read, Select 4, Add, Z_{in}

5 - Z_{out}, PC_{in}, Y_{in}

6 - R₁_{out}, Y_{in}, WMfc

7 - MDR_{out}, Select 4, Add, Z_{in}

8 - Z_{out}, R₁_{in}, End.

[1] sec 4

④ ADD ^{→ Absolute} num, R₁

①

⑤ Z_{out}, R_{in}, Y_{in}, WMFC

⑥ MDR_{out}, MAR_{in}, Read

⑦ R_{out}, Y_{in}, WMFC

⑧ MDR_{out}, select y, Add, Z_{in}

⑨ Z_{out}, R_{in}, End.

ADD ^{→ indirect} (num), R₁

⑤

①

⑥ MDR_{out}, MAR_{in}, Read, WMFC

⑦ MDR_{out}, MAR_{in}, Read

⑧, y, 10 → 7, 8, 9

② Sec 9

a Program for A, B, C

- 1 \rightarrow 4
- 5 - Z_{out} , PC_{in} , Y_{in} if Imm branch to 1.
- 6 - WMFC
- 7 - MDR_{out} , MAR_{in} , Read, if Abs branch;
- 8 - WMFC
- 9 - MDR_{out} , MAR_{in} , Read.
- 10 - 7 \rightarrow 9

[3]

Sec 4

7

$$\frac{28}{42} = 67\%$$

2ns

- 1- _____
- 2- _____, WMFC memory 16ns
CPU ← 2ns
- 3- _____ 2ns
- 4- _____
- 5- _____, WMFC 16ns
- 6- _____ 2ns
- 7- _____ 2ns

How long does memory take as a percent
of overall time of CPU instruction execution.

4 Sec 9

Sheet 5

- Single bus CPU

- 1 - PC_{out} , MAR_{in} , Read, select 4, Add, \bar{Z} ,
- 2 - Z_{out} , PC_{in} , y_{in} , wait
- 3 - MDR_{out} , IR_{in} .
- 4 - (offset field of IR)_{out}, Add, if $N=1$ then PC_{in} , End

Branch \rightarrow

- multibus CPU \leftarrow سبوح الهمد

- 1 - PC_{out} , $R=B$, MAR_{in} , Read, Inc PC
- 2 - $WMPC$
- 3 - MDR_{out} , $R=B$, IR_{in}
- 4 - PC_{out} , (offset field of IR)_{out},
Add, if $N=1$, then PC_{in} , End.

5 sec 9